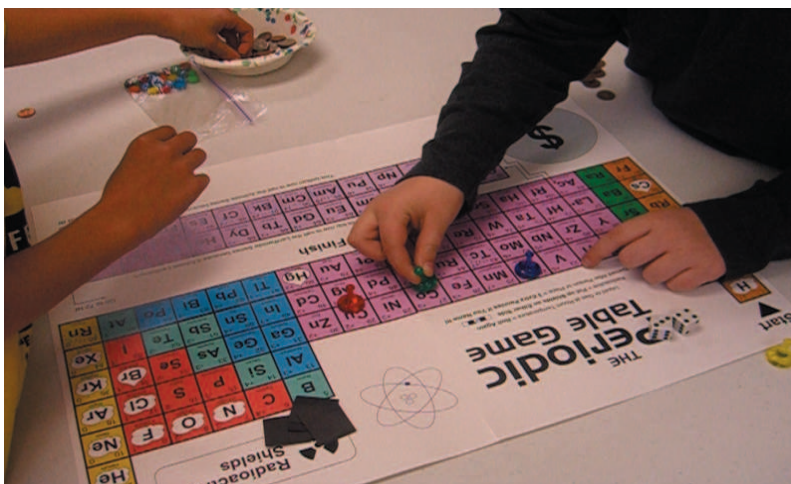


THE PERIODIC TABLE GAME



Age level: Grades 4 and up

Time to assemble: 10 minutes

Time to play: at least 30 minutes

Science topics covered: The basic layout of the Periodic Table (atomic numbers), familiarity with the names and symbols of the elements, the most common valence number of each element (restricted to just one number-- the one that best shows the mathematical patterns of the Table), and which elements are radioactive.

You will need: copies of the four pattern pages, assembled to make the Periodic Table, coins (at least 5 pennies, 5 nickels, 5 dimes, and 1 quarter per player), a tuna can or small plastic container of similar size, a pair of standard dice, some tokens, one per players (they don't have to be real game tokens- you can use anything), some black paper squares the size of one space on the game board (two rectangles per player)

You may also want to make copies of the list of names and places (page 3 of this PDF) for the students to study before the game starts. Once the game starts, no peeking at the list!

About the game board:

The number in the upper right hand corner of each square is the valence number. It is the number of electrons the element would like to receive or give away. Many elements (especially in the middle of the table) have more than one valence number. We have chosen just to list the highest valence for each element. It simplifies the game considerably and makes the mathematical pattern of the table more obvious. However, you may want to make your players aware that in reality many of the elements can have more than one valence number. In this game, the elements in each column end up displaying the same valence, which is a basic concept in learning to understand the Periodic Table. The word "periodic" means it has repeating patterns, and the valencies are one of these patterns. Notice that the last five elements do not have a valence number listed. These elements only exist for a fraction of a second and therefore their valence cannot be determined.

The large letters in each box are the letter symbols for each element. Underneath the letter symbol is the name of the element.

Most elements are solids at room temperature. Notice that the elements that are liquids at room temperature are marked with a liquid drop, and those that are gases at room temperature are marked with a gas cloud.

There is a strange break at two places in the Periodic Table. One is after Lanthanum and one is after Actinium. These extra sections are listed at the bottom of the table simply because inserting them in them in the middle of the table would make the table too wide to fit comfortably on a page. There's no scientific reason for putting them at the bottom-- it's simply a graphics decision.

The black and white version of the game is the same as the color version (except for the color, of course). The colored sections correspond to the "families" on the table: alkali metals (orange), alkali earth metals (green), transition metals (purple), true metals (dark blue), semi-metals (light blue), non-metals (red), and noble gases (yellow).

How to play:

Before starting the game, players get a chance to study the information page that lists elements named after people and places. You might want to make additional photocopies of it. Once the game starts, no peeking except to check answers.

- 1) Put all the coins in the can and place it on the circle marked BANK. Put the players' tokens on START. Give each player 5 pennies to begin with.
- 2) Players take turns moving the number of spaces they roll on the die. Two players can both be on the same space.
- 3) When a player lands on a space, he looks at the valence number, which is in the upper right corner. If it is a positive number, he takes that many pennies from the bank. If the number is negative, he loses that many pennies and must put them into the bank.
- 4) Certain elements have special features:
 - GASEOUS ELEMENTS (indicated by a cloud shape): extra roll
 - LIQUID ELEMENTS (indicated by a droplet shape): extra roll
 - PRECIOUS METAL: bonus of three pennies (Precious metals include silver, gold, platinum. You may add others to your list if you want to, as long as everyone agrees.)
 - RADIOACTIVE ELEMENTS: The radioactive elements have little "shine" lines around their letter symbols. The player must place a black shield on the space before and the space after that space, to keep other players "safe." No one can land on black space. If other players come past while the shields are in place, they simply hop over all three spaces (the two with the black shields and the one in the middle that has a token sitting on it) and keep going with their turn. Those three spaces do not count at all (they do not use up three hops). Just ignore those three spaces as if they were not there. When it is the radioactive player's turn again, he removes the black shields and simply proceeds with his turn.
 - ELEMENT NAMED AFTER A PERSON OR PLACE: If a player lands on an element that he thinks was named after a person or a place, he may take a one-penny bonus if he can name that person or place. If he is wrong, he does not get the bonus, but there is no penalty for guessing.
 - LANTHANUM and ACTINIUM: If a player's final hop of his turn lands him on either lanthanum or actinium, then on his next turn he must proceed to the appropriate series, either lanthanide or actinide. (If a player passes lanthanum or actinium in the middle of his hops, he may keep right on going and skip the series.) After a player does the series at the bottom, he jumps back to the main board, onto the appropriate space, either hafnium or rutherfordium.
- 5) At any time during the game a player may "make change," trading in pennies for nickels or dimes. The bank needs to have a good supply of pennies all the time, so when that supply gets low, players must make change to restock the bank.
- 6) You do not have to land on FINISH with an exact roll. When all players have reached FINISH, the game is over. The players then count their money and the player with the most money wins.

ELEMENTS NAMED AFTER PLACES:

Americium: America
Berkelium: Berkeley, CA
Californium: California
Cerium: the asteroid Ceres
Erbium: Swedish town of Ytterby
Europium: Europe
Francium: France
Gallium: France (Gall was the ancient name for France)
Germanium: Germany
Hafnium: Hafnia is Latin for Copenhagen, Denmark
Holmium: Stockholm, Sweden
Neptunium: the planet Neptune
Palladium: the asteroid Pallas
Plutonium: the until-recently-a-planet Pluto
Polonium: Poland
Rhenium: the Rhine area of Germany
Ruthenium: the province of Ruthenia in the Czech Republic
Scandium: Scandinavia
Strontium: Scottish town of Strontian
Tellurium: the planet Earth (the Greek word is Tellus)
Terbium: the Swedish town of Ytterby
Thulium: Scandinavia (the ancient name for Scandinavia was Thule)
Uranium: the planet Uranus
Ytterbium: the Swedish town of Ytterby
Yttrium: again, for the fourth time, the Swedish town of Ytterby!

ELEMENTS NAMED AFTER PEOPLE:

Curium: Marie and Pierre Curie, discoverers of radium and polonium
Einsteinium: Albert Einstein
Fermium: Enrico Fermi, a physicist during the World War II era
Gadolinium: Johan Gadolin, a Finnish chemist
Gallium: Lecoq de Boisbaudran, a 19th century chemist (Gallus is Latin for "cock")
Lawrencium: Ernest O. Lawrence, a 20th century physicist
Mendelevium: Dmitri Mendeleev, inventor of the Periodic Table
Meitnerium: Lise Meitner, a 20th century physicist
Mercury: Mercury, mythological Roman god
Niobium: Niobe, the daughter of mythological Greek god Tantalus
Nobelium: Alfred Nobel, inventor of dynamite, and namesake of the Nobel Prize
Niels-Bohrium: Niels Bohr, a 20th century chemist and physicist
Promethium: Prometheus, mythological Greek god who gave fire to mankind
Seaborgium: Glenn Seaborg, a 20th century chemist and physicist
Tantalum: Tantalus, mythological Greek god
Tin: Tinia, mythological Etruscan god ("Sn" comes from its Latin name, stannum)
Thorium: Thor, mythological Norse god of thunder
Vanadium: Vanadis, mythological Scandinavian goddess

Start



THE Periodic Table Game

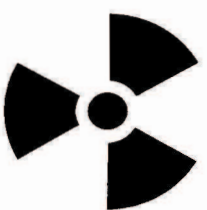
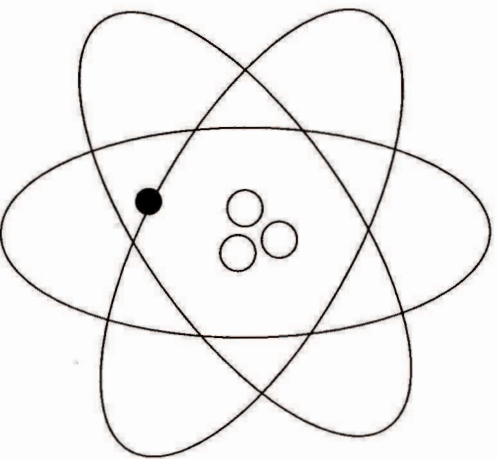
Liquid or Gas at Room Temperature > Roll Again

Radioactive > Put up Shields on Either Side



Named After Person or Place > 3 Extra Pennies if You Name It!

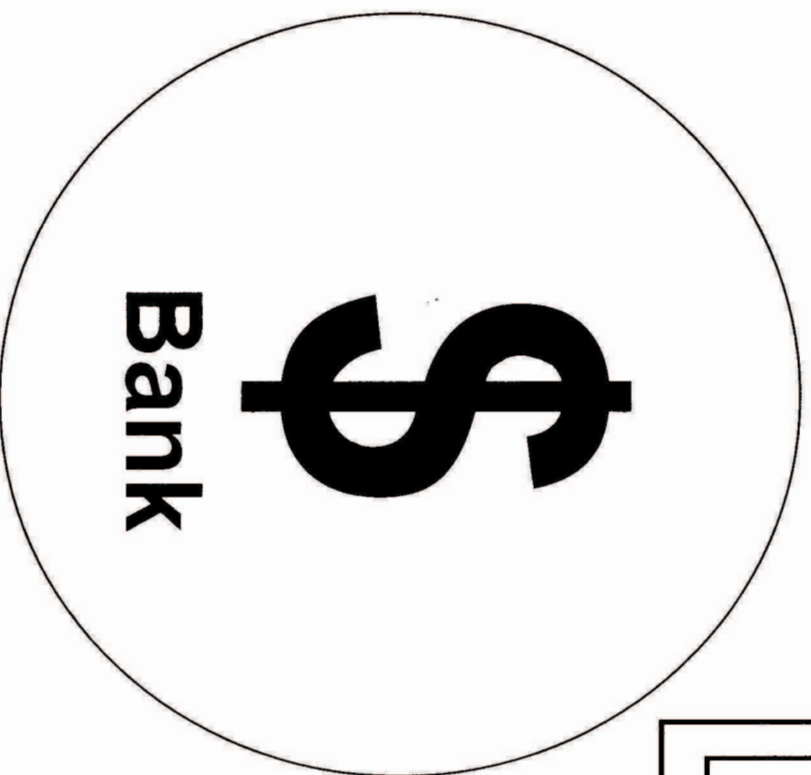
1 +1 H Hydrogen	3 +1 Li Lithium	4 +2 Be Beryllium	21 +3 Sc Scandium	22 +4 Ti Titanium	23 +5 V Vanadium	24 +6 Cr Chromium	25 +7 Mn Manganese	26 +3 Fe Iron	27 +3 Co Cobalt
11 +1 Na Sodium	12 +2 Mg Magnesium	19 +1 K Potassium	20 +2 Ca Calcium	39 +3 Y Yttrium	40 +4 Zr Zirconium	41 +5 Nb Niobium	42 +6 Mo Molybdenum	43 +7 Tc Technetium	44 +3 Ru Ruthenium
37 +1 Rb Rubidium	38 +2 Sr Strontium	39 +3 Y Yttrium	40 +4 Zr Zirconium	41 +5 Nb Niobium	42 +6 Mo Molybdenum	43 +7 Tc Technetium	44 +3 Ru Ruthenium	45 +3 Rh Rhodium	



Radioactive Shields

2 He Helium 0	10 Ne Neon 0	18 Ar Argon 0	36 Kr Krypton 0	54 Xe Xenon 0
5 B Boron +3	6 C Carbon +4	7 N Nitrogen -3	8 O Oxygen -2	9 F Fluorine -1
13 Al Aluminum +3	14 Si Silicon +4	15 P Phosphorus -3	16 S Sulfur -2	17 Cl Chlorine -1
28 Ni Nickel +3	29 Cu Copper +2	30 Zn Zinc +2	31 Ga Gallium +3	32 Ge Germanium +4
46 Pd Palladium +4	47 Ag Silver +1	48 Cd Cadmium +2	49 In Indium +3	50 Sn Tin +4
			51 Sb Antimony -3	52 Te Tellurium -2
			53 I Iodine -1	

55 +1 Cs Cesium	56 +2 Ba Barium	57 +3 La Lanthanum	72 +4 Hf Hafnium	73 +5 Ta Tantalum	74 +6 W Tungsten	75 +7 Re Rhenium	76 +3 Os Osmium	77 +4 Ir Iridium
87 \, / +1 Fr Francium	88 \, / +2 Ra Radium	89 \, / +3 Ac Actinium	104 +4 Rf Rutherfordium	105 Ha Hahnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium



58 +3 Ce Cerium	59 +3 Pr Praseodymium	60 +3 Nd Neodymium	61 +3 Pm Promethium	62 +3 Sm Samarium
90 \, / +4 Th Thorium	91 \, / +5 Pa Protactinium	92 \, / +6 U Uranium	93 \, / +6 Np Neptunium	94 \, / +6 Pu Plutonium

78 +4 Pt Platinum	79 +3 Au Gold	80 +2 Hg Mercury	81 +3 Tl Thallium	82 +4 Pb Lead	83 -3 Bi Bismuth	84 -2 Po Polonium	85 -1 At Astatine	86 0 Rn Radon
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 **Finish**

Go to 72 Hf

This top row is call the Lanthanide Series because it follows Lanthanum

63 +3 Eu Europium	64 +3 Gd Gadolinium	65 +3 Tb Terbium	66 +3 Dy Dysprosium	67 +3 Ho Holmium	68 +3 Er Erbium	69 +3 Tm Thulium	70 +3 Yb Ytterbium	71 +3 Lu Lutetium
95 +6 Am Americium	96 +4 Cm Curium	97 +4 Bk Berkelium	98 +4 Cf Californium	99 +3 Es Einsteinium	100 +3 Fm Fermium	101 +3 Md Mendelevium	102 +3 No Nobelium	103 +3 Lr Lawrencium

This bottom row is call the Actinide Series because it follows Actinium

Go to 104 Rf

Start



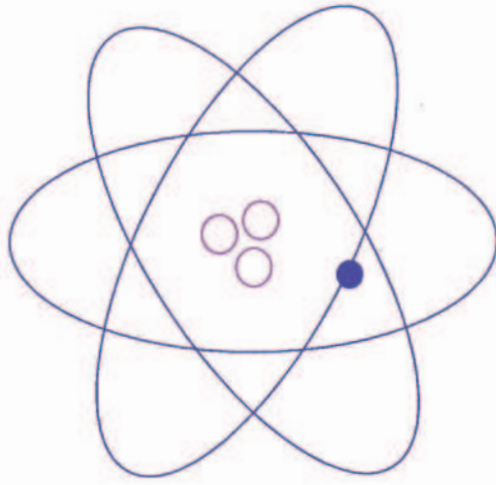
THE Periodic Table Game

Liquid or Gas at Room Temperature > Roll Again

Radioactive > Put up Shields on Either Side 

Named After Person or Place > 3 Extra Pennies if You Name It!

1 +1 H Hydrogen									
3 +1 Li Lithium	4 +2 Be Beryllium								
11 +1 Na Sodium	12 +2 Mg Magnesium								
19 +1 K Potassium	20 +2 Ca Calcium	21 +3 Sc Scandium	22 +4 Ti Titanium	23 +5 V Vanadium	24 +6 Cr Chromium	25 +7 Mn Manganese	26 +3 Fe Iron	27 +3 Co Cobalt	
37 +1 Rb Rubidium	38 +2 Sr Strontium	39 +3 Y Yttrium	40 +4 Zr Zirconium	41 +5 Nb Niobium	42 +6 Mo Molybdenum	43 +7 Tc Technetium	44 +3 Ru Ruthenium	45 +3 Rh Rhodium	

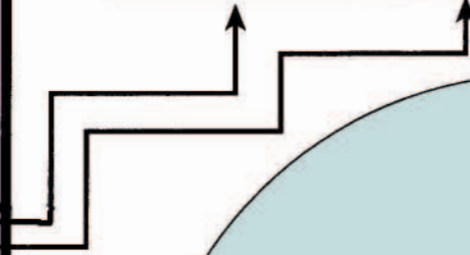
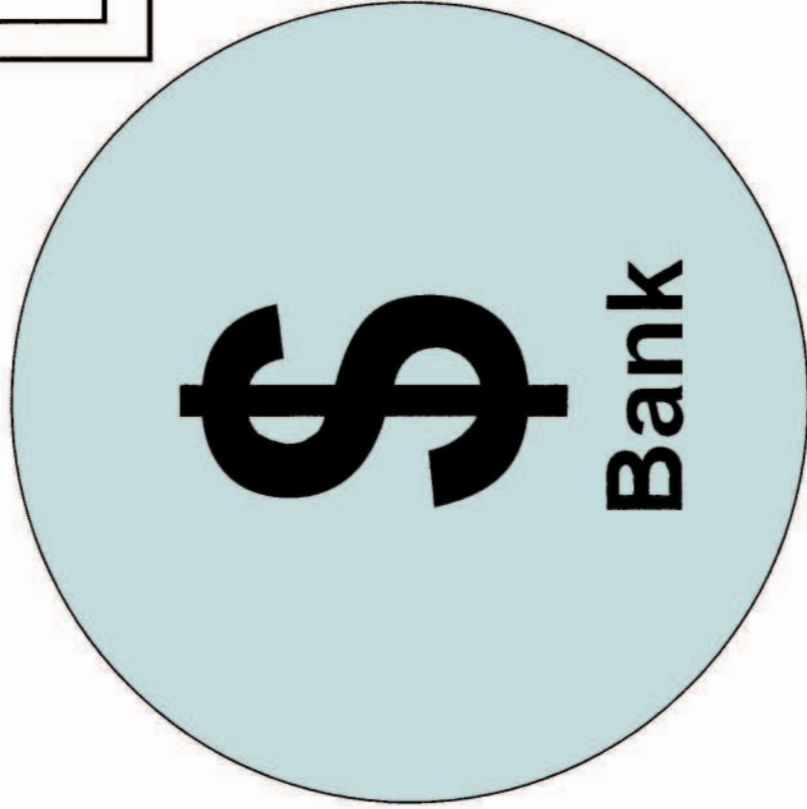


Radioactive Shields

28	+3	Ni	Nickel	29	+2	Cu	Copper	30	+2	Zn	Zinc	36	0	Kr	Krypton
46	+4	Pd	Palladium	47	+1	Ag	Silver	48	+2	Cd	Cadmium	53	-1	I	Iodine
51	-3	Sb	Antimony	50	+4	Sn	Tin	52	-2	Te	Tellurium	34	-2	Se	Selenium
33	-3	As	Arsenic	32	+4	Ge	Germanium	31	+3	Ga	Gallium	15	-3	P	Phosphorus
13	+3	Al	Aluminum	14	+4	Si	Silicon	6	+4	C	Carbon	7	-3	N	Nitrogen
5	+3	B	Boron	13	+3	Al	Aluminum	14	+4	Si	Silicon	8	-2	O	Oxygen
9	-1	F	Fluorine	17	-1	Cl	Chlorine	35	-1	Br	Bromine	10	0	Ne	Neon
2	0	He	Helium	18	0	Ar	Argon	36	0	Kr	Krypton	54	0	Xe	Xenon

55 Cs Cesium +1	56 Ba Barium +2	57 La Lanthanum +3	72 Hf Hafnium +4	73 Ta Tantalum +5	74 W Tungsten +6	75 Re Rhenium +7	76 Os Osmium +3	77 Ir Iridium +4
87 Fr Francium +1	88 Ra Radium +2	89 Ac Actinium +3	104 Rf Rutherfordium +4	105 Ha Hahnium +5	106 Sg Seaborgium +6	107 Bh Bohrium +7	108 Hs Hassium +3	109 Mt Meitnerium +3

58 Ce Cerium +3	59 Pr Praseodymium +3	60 Nd Neodymium +3	61 Pm Promethium +3	62 Sm Samarium +3
90 Th Thorium +4	91 Pa Protactinium +5	92 U Uranium +6	93 Np Neptunium +6	94 Pu Plutonium +6



78 +4 Pt Platinum	79 +3 Au Gold	80 +2 Hg Mercury	81 +3 Tl Thallium	82 +4 Pb Lead	83 -3 Bi Bismuth	84 -2 Po Polonium	85 -1 At Astatine	86 0 Rn Radon
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Go to 104 Rf